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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Kiyoshi Sato

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EXAMINER

CHEN, TIANJIE

ART UNIT

PAPER NUMBER

2652

25

DATE MAILED: 07/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/802,314

Applicant(s)

SATO ET AL.

Examiner

Tianjie Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 14-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 18 and 19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 24.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: ____.

Final Rejection

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claim 8 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 8 recites: the upper core layer includes, a front region which extends from the tip surface in the height direction and has a uniform width in the track width direction; and also inherits from dependence: wherein a tip surface of the upper core layer contacts the upper pole layer is located at a setback distance from the face surface in a height direction, wherein the height direction is a direction generally perpendicular to the face surface, such that the setback distance gradually increases in a track width direction, wherein the track width direction is a direction generally parallel to the face surface. However, none of the embodiment disclosed in this Application possesses these two features.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject

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matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al (US 6,597,543) in view of Ohtomo et al (US 6,101,068).

With regard to claim 1, Saito et al shows a thin-film magnetic head in Figs. 1 and 2 /or 10b and 10c including: a lower core layer 12; a recording core formed on the lower core layer and exposed at a face surface that faces a recording medium, the recording core including a structure having a gap layer 84 and an upper pole layer 141 sequentially arranged in that order; an upper core layer 142 /or 142a magnetically coupled to the upper pole layer; and a coil 88 for inducing a recording magnetic field to the lower core layer, the recording core, and the upper core layer, wherein a tip surface of the upper core layer 142 /or 142a contacts the upper pole layer 141 is located at a setback distance from the face surface in a height direction, wherein the height direction is a direction generally perpendicular to the face surface, such that the setback distance gradually increases in a track width direction from a point the tip surface contacts the upper pole layer, wherein the track width direction is a direction generally parallel to the face surface (Fig. 10c).

Saito et al does not show that the tip surface is one of an inclined or a curved surface.

Ohtomo et al show a thin-film magnetic head in Fig. 1A, wherein the setback portion 15(b) of the upper core portion is inclined and has an inclining angle $\theta_2 = 60^\circ$ (Column 13, line 12-14).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to set the tip surface of the upper core in Saito et al's device

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having an inclined region having inclining θ_2 . The rationale is as follows: Ohtomo et al teaches that if the inclining angle θ_2 is greater than 80° a defect may be generated in the plated film at the boundary between two surfaces, resulting in deterioration in recording characteristics (Column 6, line 67 to column 7, line 6). Saito's inclining angle $\theta_2 = 90^\circ$, according to Ohtomo et al which would causes deterioration. One of ordinary skill in the art would have been motivated to reshape the tip surface to an inclined surface having $\theta_2 = 60^\circ$ thus avoiding deterioration of recording characteristics.

With regard to claim 2, Saito et al further shows that the shortest setback distance from the face surface to the tip surface of the upper core layer is equal to or less than a largest length of the recording core measured from the face surface.

With regard to claim 3, Saito et al does not specify the distance. However, Saito teaches: to improve the recording capacity under high-density recording, it is preferable to decrease the gap depth D to $1.0\text{ }\mu\text{m}$ or less. One of ordinary skill in the art would have been motivated to set $D < 1.0\text{ }\mu\text{m}$ to improve recording capacity. It can be seen from Fig. 1 that the setback distance from the face surface to the tip surface of the upper core layer $L3$ is equal or less than D , i. e. it would satisfy the relationship:

$$\text{about } 0\text{ }\mu\text{m} < L3 \leq \text{about } 0.8\text{ }\mu\text{m}.$$

With regard to claims 4 and 5, Saito does not show second inclined region. Ohtomo et al further shows in Fig. 1A that the upper core includes a back surface 15c which is set back from the tip surface in the height direction, wherein the back surface is a curved surface, Saito shows that in which the setback distance gradually increases in the track width direction (Fig. 10C), Ohtomo et al further shows that the inclination angle θ_2 is greater than an inclination angle θ_2 , where inclination angle θ_2

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is the angle of a tangent line at a midpoint between an end of the curved surface near the recording core and an end of the curved surface near an underside of the upper core layer side, and angle θ_2 is the inclination of a tangent line at a midpoint between an end of the curved surface near the magnetic core and an end of the curved surface at an upper surface of the upper core layer and the inclination angle θ_2 satisfies the relationship about $60^\circ \leq \theta_2 < \text{about } 90^\circ$ (Column 6, line 58 to column 7, line 5).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to set the tip surface of the upper core in Saito et al's device further having an inclined region having inclining θ_2 . The rationale is as follows: Ohtomo et al teaches that the structure having inclining angle θ_2 and θ_2 would decrease the variation in the film thickness h of the upper magnetic pole (core), which variation would otherwise be produced due to machining variations in the throat height d . Therefore, variation in the recording characteristics can be decreased (Column 6, lines 7-13). One of ordinary skill in the art would have been motivated to reshape the upper core to have a back surface having an inclining angle θ_2 thus decreasing variations.

With regard to claim 6, in above constructed Saito et al and Ohtomo et al's device, the tip surface of the upper core layer includes a curved surface which gradually recedes in the height direction (Fig. 10c) and which recedes toward side surfaces of the tip surface, wherein the side surfaces are displaced apart from one another in the track width direction.

With regard to claim 7, Ohtomo et al further shows that tangent lines that touch endpoints of the curved surface have an angle of inclination relative to the track width direction of about 30° to about 60° (Fig. 10c).

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With regard to claim 8, Saito et al further shows in Fig. 2 that the upper core layer includes, a front region 142 which extends from the tip surface in the height direction and has a uniform width in the track width direction; and a back direction region (behind 142) which extends from a side opposite the tip surface in the height direction and in which the width of the back region in the track width direction gradually increases in the height direction.

With regard to claim 9, Saito et al further shows that the upper core layer 142a further includes an edge surface in contact with the upper pole layer, and wherein, at the edge surface, the width of the upper core layer in the track width direction is greater than the width of the upper pole layer in the track width direction (Fig. 10c).

With regard to claim 10, Saito et al further shows in Figs. 10b and 10c that the recording core includes a front region in 141, which extends from the face surface in the height direction and has a uniform width in the track width direction; and a back region in 141, which extends from the front region in the height direction and in which a width of the back region in the track width direction gradually increases in the height direction.

With regard to claim 11, Haruo et al further shows that the upper core layer 142a is connected to at least the back region of the recording core.

With regard to claim 12, Saito further shows that the gap layer 84 is made of a non-magnetic metallic material Al_2O_3 (Column 5, lines 6, lines 18-19).

3. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al in view of Ohtomo et al as applied to claim 1 further in view of Yamanaka et al (US 6,487,041).

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With regard to claim 13, Saito does not show that the nonmagnetic metallic material is selected from the group consisting of NiP, NiPd, NiW, NiMo, Au, Pt, Rh, Pd, Ru, and Cr.

Yamanaka et al shows a thin-film magnetic head in Fig. 2 and teaches NiP can be used as an alternative of Al_2O_3 for making the gap layer.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to include NiP as an alternative for the gap in order to have more flexibility in manufacturing.

4. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al in view of Ohtomo et al as applied to claim 1, further in view of Sasaki (US 6,317,288).

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al in view of Ohtomo et al and Sasaki (US 6,317,288).

With regard to claims 18 and 19, Saito et al and Ohtomo et al show a thin-film magnetic head as described above, but fails to show a second coil layer overlaying the coil layer and separated therefrom by an insulating layer.

Sasaki shows a thin-film magnetic head in Fig. 12A, wherein a second coil layer overlaying the coil layer and separated therefrom by an insulating layer.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to add the second coil layer taught by Sasaki into Saito et al's device. The rationale is as follows: Sasaki teaches that yoke length can be made shorter with two-layered coil than one-layered coil so that most of recording head for high frequency employ the two-layered coil (Column 5, lines 14-16). One of ordinary

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skill in the art would have been motivated by Sasaki's teaching to add the second coil layer for being used for high frequency.

Response to Arguments

5. Applicant's arguments with respect to claims 1-13 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

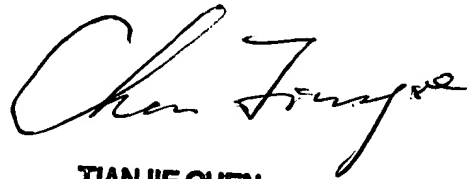
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tianjie Chen whose telephone number is (703) 305-7499. The examiner can normally be reached on 8:00-4:30, Mon-Fri.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Nguyen can be reached on (703) 305-9687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Chen Tianjie", with a stylized flourish at the end.

**TIANJIE CHEN
PRIMARY EXAMINER**